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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/917,751
Filing Date: July 31, 2001
Appellant(s): LIAO ET AL.

Richard E. Fichter (26,382)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 29, 2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement that there are no related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,958,087	LIAO et al.	09-1999
5,998,094	ISHIDA et al.	12-1999
4,735,839	SATO et al.	04-1988
08-108631	CHO et al.	04-1996

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A Claims 30-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al. '087 combined with Cho et al. JP 08-108631, in view of Sato et al. '839.

Liao et al. '087 teach the use of mixtures of pentamethine and trimethine indolene dyes which have 4-methoxycarbonyl benzyl moieties bound to the nitrogen on the indole ring. Figure 1 shows the absorbance of the trimethine dye to be at 556 nm and figure 2 shows the pentamethine dye to have a maximum absorbance at 648 nm. The recording disk structure is a polycarbonate substrate coated with a solution of the two dyes, overcoated with a silver or gold 100 – 250 nm reflective layer and a 1 micron protective layer. (5/39-60). The total content of the trimethine dye in the coating solution is 0.5 to 5% (claim 7), preferably 1.3 to 1.7% (claim 8). The amount of the pentamethine dye to the trimethine dye is 1 to 10 % (claim 5), preferably 3.5 to 5% (claim 6). The various coating solvents are disclosed in claims 9-15 and include alcohols, ethers, ketones, tetrafluoropropanol, chloroform, dichloromethane and dimethylformamide. Useful counterions are disclosed including acid anions, halogens, alkylsulfonate arylsulfonate and perchlorates. (3/17-28). The use of 1.5 g of the trimethine dye and 0.075g of the pentamethine dyes in 100g of a TFP solution is disclosed. The pentamethine dye is present as 5% of the trimethine dye. These dyes are described as having improved solubility and higher thermal stability vs. other similar cyanine dyes. (2/2-4).

Cho et al. JP 08-108631 (Japanese equivalent of US- 5579150, machine translation attached) teaches cyanine dyes TCNQ single salts/complexes as shown in formula I, which results in a cyanine dyes based recording medium with improved recording sensibility

(sensitivity) [0007-0009]. The reflectivity is also improved due to the use of the complex [0018]. The solubility, and sensitivity are increased due to the use of the TCNQ complexed cyanine dye. Cyanine dyes by themselves are described as having "a fault of being unstable, to light or heat" [0005].

Sato et al. '839 teach that unsymmetrical indoleneic cyanine dyes have higher solubility and stability. (abstract and 2/10-15). Indoleneic and benzoindolenic dyes are described throughout. The addition of stabilizers is disclosed. (21/49 and 21/57-23/35). The addition of various materials to the recording layer is disclosed including polymeric binders, the polymeric binder is held to act as an adhesive/glue. The N- substituents may be substituted or alkyl moieties. The recording layer may be 10-500 nm (23/36-41). Useful protective layers may be 0.2 to 10 microns (24/9-25). Materials for providing improved reflectance include Zn, Cu, Ni, Cr, Ge, Se, Al, Ag. (24/20-24).

It would have been obvious to use TCNQ counterions as disclosed by Cho et al. JP 08-108631 as the counterions for the indolenic cyanine dyes in the mixtures of pentamethine and trimethine indolene cyanine dyes containing optical recording media of Liao et al. '087 with a reasonable expectation of gaining in reflectivity and sensitivity taught by Cho et al. JP 08-108631 and/or it would have been obvious to use the mixtures of pentamethine and trimethine indolene cyanine dyes having (4-methoxycarbonyl)benzyl moieties as the N substituents on the indolene terminal moieties of Liao et al. '087 in place of those cyanine dyes used in the examples of Cho et al. JP 08-108631 with a reasonable expectation of realizing the gains in solubility and thermal stability taught by Liao et al. '087 and further it would have been obvious to modify the trimethine cyanine dyes of the resulting mixture of pentamethine and trimethine indolene

cyanine dyes with TCNQ counterions in the optical recording medium resulting from the combination of Liao et al. '087 and Cho et al. JP 08-108631 by modifying one of the N substituents on the trimethine to be an unsubstituted alkyl, such as butyl, rather than an alkyl substituted by a methyl ester of 4- benzoic acid with a reasonable expectation of increasing the solubility of that dye mixture over the case where both of the pentamethine and trimethine indolene cyanine dyes have the same substituents based upon the disclosure of Sato et al. '839 that unsymmetric alkyl N-substituents on the indolenic moieties results in increase solubility and stability.

B Claims 30-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liao et al. '087 combined with Cho et al. JP 08-108631, in view of Sato et al. '839, further in view of Ishida et al. '094.

Ishida et al. '094 teach the dyes of formulae I mixed with TCNQ compounds A1 or A2. The use of recording layer having thicknesses of 50-300 nm is disclosed. (21/32-36). The use of various metals, such as the preferred Au, Ag, Al, Cu, Cr and alloys thereof in thicknesses of 50-300 nm is disclosed. (21/40-59). The use of singlet oxygen quenchers as dopants is disclosed as good, but may not be satisfactory when added to recording layers containing cyanine dyes. (1/46-2/12).

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the optical recording medium resulting from the combination of Liao et al. '087, Cho et al. JP 08-108631 and Sato et al. '839 by using other thicknesses for the reflective and/or recording layers and/or other reflective layer materials known in the optical recording

media art to useful with cyanine dyes based optical recording media, such as those taught by Ishida et al. '094 with a reasonable expectation of forming a useful optical recording medium.

(11) Response to Argument

A The applicant points to the three requirements of USC 103, the motivation to combine, the suggestion of all the limitations, and the reasonable expectation of success. The Liao et al. reference teaches mixtures of pentamethine and trimethine indolene cyanine dyes bearing methyl ester of 4- benzoic acid substituents in the appropriate ratios forming a recording layer, by spin coating, a 1000 angstrom (100 nm) gold reflective layer and a protective layer. The use of the methyl ester of 4- benzoic acid substituents is disclosed as resulting in gains in solubility and thermal stability. Therefore the use of the dye mixtures is taught as is the value of the methyl ester of 4- benzoic acid as N-substituents on indolene moieties. Cho et al. JP 08-108631 establishes that the use of TCNQ counterions with cyanine dyes results in gains in reflectivity, solubility, lightfastness and sensitivity, which provides motivation/benefits and teaches the use of the TCNQ counterions with cyanine dyes. The Sato et al. reference teaches that changing one of the N-substituents to make dyes less structurally similar is old (1988) and the resulting increase in solubility well known in the art. The specific use of either **substituted** or unsubstituted **alkyl groups as the N- substituents is also disclosed**. Therefore the motivation/benefit of change one of the alkyl N- substutuents is old and well known in the art. These references all concern cyanine dyes based optical recording media and therefore the reasonable expectation of success of forming useful cyanine dye based optical recording media is

reasonably assured. The motivation provided by the references undercuts the (impermissible) hindsight argument of the applicant.

The applicant argues in page 5 of the brief that due to the teaching of Liao et al. describing only trimethine (n=1) and pentamethine (n=2) indolenic cyanine dyes and Cho et al. JP 08-108631 discussing pentamethine or longer chained indolenic cyanine dyes, the teachings of these references would not be considered analogous. The examiner notes that the differences in the chain length are clearly recognizable as relating to the absorption of the dye and are chosen on the basis of the wavelength with which the recording medium is to be used. Liao et al. '087 describes optical recording media useful in the 450-650 nm range (abstract) and the trimethine dye (n=1) absorbs at 556 nm (4/28-31) and the pentamethine dye (n=2) absorbs at 648 nm (5/33-38). The recording medium of Cho et al. JP 08-108631is described as being useful with laser operating in the 780-830 nm wavelength range [0008]. Accordingly the methine chain is longer and the dyes absorb at 638 nm [0019], 741 nm [0017], 814 nm [0021] and 817 nm [0023]. The examiner notes the overlap where n may be 2. Clearly the dyes are the same class and the teachings with respect to the stabilization of one indolenic cyanine dye would be expected to be valid for the entire class. The examiner also point to known use of TCNQ compounds within the art for stabilizing dyes as evidenced by Ishida et al. '094 (1/58-62) and the use of TCNQ derivatives by Ishida et al. '094 with monomethine (n=0 in formula of Liao et al.; j=0,k=0) to heptamethine (n-=3 in formula of Liao et al.; j=2,k=1) indolenic cyanine dyes (3/40-63). This serves to further establish a reasonable expectation of gleaning the advantages ascribed to the use of TCNQ in place of acid anion taught by Cho et al. JP 08-108631 with the indolenic cyanine dyes of Liao et al. '087 The prior as a whole clearly teaches advantages of adding the

TCNQ to the cyanine dyes including reduced fading of the cyanine dyes (anti-fading in Ishida et al. '094 at 1/46-62 and 2/2/31-35), and when used as a counter ion to the cyanine dyes improved sensitivity, reflectivity, improved spectral sensitivity and solubility (Cho et al. at [0007-0008,0018,0020 & 0027]). Cho et al. also describes cyanine dyes alone as being unstable to light and heat. The applicant notes that the photostability (antifading) is increased on page 8 at lines 5-20 of the instant specification (see brief at pages 3), but as evidenced in the cited portions of the prior art, this cannot be an unexpected result as it is specifically described in the prior art. Additionally, the motivation to use the TCNQ as a counter ion, rather than as separate additive is present in Cho et al. **With respect to the data on page 9 of the appeal brief and previously presented on 12/12/03, there is clearly a recognized benefit to the TCNQ being a counterion as discussed above and Morishima et al, "A new type of Light Stabilizer for dye layers of optical disks: tetracyanoquinodimethane derivatives", Jpn. J. Appl. Phys. Vol. 38, part 1, No. 3B, pp. 1634-1637 (03/1999) is not applied in the rejection and it is not clear how Morishima et al., which merely mixes TCNQ with cyanine dyes could be a better comparison than the prior art applied in the rejections which uses the TCNQ as the counterion.** When comparing with Morishima et al. one has to consider the differences between the dyes and whether these differences are known to confer certain properties. In particular, Liao et al. '087, the dyes having the (4-methoxycarbonyl)benzyl moieties as the N substituents on the indolene terminal moieties are described as having good solubility in organic solvents and thermal stability (1/66-2/4) and further when the N substituents are different Sato et al. '839 teaches that solubility is increased for indolenic cyanine dyes (abstract and 2/10-15). Therefore the increased solubility is not unappreciated in the prior art for indolenic cyanine dyes having

different N substituents or (4-methoxycarbonyl)benzyl moieties as the N substituents. The applicant's representative has included data, which would have to be submitted in proper declaration form to have it's full impact.. The applicant asserts that the claimed invention has a higher solubility that the compounds of Morishima et al.. This result seems to be recognized in the art as is its underlying cause. The dyes of Liao et al. '087 are described as having improved solubility and higher thermal stability vs. other similar cyanine dyes. (2/2-4) and the use of dissimilar N- substituents is also recognized as resulting in increased solubility (Sato et al. abstract and 2/10-15). Therefore the benefit argued appears to be recognized in the art. There may be an issue of the degree of increased solubility, but the data submitted by the applicant is not of sufficient detail to address this.

On page 8 of the brief, the applicant argues that the test data in Liao et al., "Quencher free optical recording materials: photofading experimental and antiphotofading mechanism studies", Jpn. J. Appl. Phys Vol 42, Part 1, No. 6a, pp. 3447-3451 (06/2003) evidences improved photostability. The examiner notes that no asymmetric or unsymmetric dyes are disclosed in the article, but they are required by the instant claims. In the article component I is a mixture of indolenic dyes with iodide counterions and analogous to the example of Liao et al. '087, component II is similar to the mixture of the example of Liao et al. '087, but the trimethine dyes (EO3) uses TCNQ as the counterion and component III is similar to the mixture of the example of Liao et al. '087, but the both the trimethine dyes (EO3) and the pentamethine dye (EO5) use TCNQ as the counterion. **None of the examples correspond to the claimed invention.** From Tables I and II, it is clear that the use of TCNQ as the counterion confers improvements in photostability. The prior as a whole clearly teaches

advantages of adding the TCNQ to the cyanine dyes including reduced fading of the cyanine dyes (anti-fading in Ishida et al. '094 at 1/46-62 and 2/2/31-35), and when used as a counter ion to the cyanine dyes improved sensitivity, reflectivity, improved spectral sensitivity and solubility (Cho et al. at [0007-0008,0018,0020 & 0027]). The applicant notes that the photostability (antifading) is increased on page 8 at lines 5-20 of the instant specification (see brief at pages 3), but as evidenced in the cited portions of the prior art, this cannot be an unexpected result as it is specifically described in the prior art. Additionally, the motivation to use the TCNQ as a counter ion, rather than as separate additive is taught by Cho et al. which describes cyanine dyes alone as having poor stability with respect to heat and light. Even if the increased photostability was not appreciated in the prior art as evidenced by the anti-fading in Ishida et al. '094 at 1/46-62 and 2/2/31-35, there is still ample motivation to use the TCNQ counterion in place of the iodide ion used in Liao et al. '087 to increase the sensitivity of the recording medium as taught by Cho et al. [0027].

With respect to the arguments that impermissible hindsight was used, the examiner notes the strength and breadth of the statements in Sato et al. '839 and notes that the (4-methoxycarbonyl)benzyl moieties as the N substituents are clearly embraced by the substituted C_1 alkyl taught in Sato et al. with respect to R_5 and unsubstituted alkyls, including butyl, are embraced by recitation with respect to R_6 in Sato et al.. Noting that the benefit of increased solubility is described as applying to both substituted and unsubstituted alkyls, one of ordinary skill in the art cannot read the teachings of Sato et al. as myopically as the applicant has. Clearly, the benefits which the applicant relies upon to support the position of unobviousness are recognized in the art along with benefits which serve to provide the motivation to modify the

invention of Liao et al. '087 according to the teachings of Cho et al. JP 08-108631 and Sato et al. '839

B The examiner agrees that the Ishida et al. '094 reference only describes cyanine dyes with TCNQ compounds. The examiner also notes the disclosure that within the prior art, TCNQ compounds are known to enhance the light resistance of cyanine dyes (1/58-62). The characterization of the reference is corrected above, but the rejection is maintained for the reasons of record.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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January 25, 2005

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